



Rensselaer

The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Fall 2023

Dr. Andrew Hillier

Professor | Department of Chemical and Biological Engineering
Iowa State University

Seminar: Wednesday, October 4, 2023
9:30 a.m. (Academy Hall Auditorium)

“Metallic Nanostructures for Tunable Optics, Plasmonics, and Optical Metamaterials”

Abstract:

In this presentation, I will describe two projects involving metallic nanostructures and nanostructured surfaces. The first involves an effort to develop optical metamaterials using a bottom-up approach. Optical metamaterials can theoretically allow complete control of a material's refractive index through the use of meta-atom resonators with prescribed electronic and magnetic resonance conditions. I will share progress on an effort to create meta-atoms using DNA origami as a template for creation of well-defined metal nanostructures possessing these desired properties. In a second project, I will describe the use of laser interference lithography as a platform for creating a wide variety of surfaces with nanoscale patterns ranging from simple one-dimensional gratings to chirped structures, quasi-crystalline lattices, and other meta-surfaces. Curved reflecting elements, for example, can be used to pattern surfaces with spatially varying undulations in one or more dimensions. Multiple exposures can be used to create a host of complex patterns and surfaces. Example applications of these surfaces include as templates to control the growth of colloidal crystals, as designer substrates for surface plasmon resonance sensing, and as tunable platforms for surfaced enhanced infrared spectroscopy.

Biography:



Andrew C. Hillier is Professor in the Department of Chemical and Biological Engineering at Iowa State University. Hillier received his B.S. in chemical engineering from the University of Nebraska in 1990 and his Ph.D. in chemical engineering from the University of Minnesota in 1995. Following a postdoctoral appointment at the University of Texas at Austin, he started his academic career at the University of Virginia, where he was a member of the Center for Electrochemical Science and Engineering (CESE). In 2003, Hillier moved to Iowa State University to join the faculty of the Department of Chemical and Biological Engineering. At Iowa State, Hillier has been on the Executive Committee of the Institute for Combinatorial Discovery, Associate Scientist with the Ames Laboratory, director of the W.M. Keck Laboratory for High Throughput Atom Scale Analysis, and served as Chair of the Department of Chemical and Biological Engineering from 2013 to 2023. Hillier's research interests include electrochemistry, thin film design and characterization, scanning probe microscopy, optical sensing at nanostructured surfaces, and atom probe tomography. Hillier has been recognized with several awards during his career, including the Camille and Henry Dreyfus New Faculty Award, a National Science Foundation CAREER Award, and a Young Investigator Award from the Office of Naval Research, and a Young Investigator Award by the Society of Electroanalytical Chemistry. He is a Fellow of the American Association for the Advancement of Science and the American Institute of Chemical Engineers.

Refreshments will be available at 9:00 a.m. in the Academy Hall Auditorium

For more information, please contact Lisa Martin (swishl@rpi.edu)